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Leadoff Interview

New Generation Network

Aiming to create a completely new information and telecommunications network which can be available in the next 10 - 15 years

NiCT

New Generation Network

Aiming to create a completely new information and telecommunications network which can be available in the next 10 - 15 years

Hiroaki Harai Group Leader, Network Architecture Group, New Generation Network Research Center

After completing his doctorate in engineering, Dr. Harai joined the Communications Research Laboratory (current NICT) in 1998. At present, he is mainly involved in the research on optical network controls, and designing optical packet switches and new generation networks.

What is a new generation network?

The Strategy Headquarters of New Generation Network Research & Development was established last year. What activities are carried out for creating a new network?

Harai: Every 5 years, NICT develops a mid-term plan, where creating a new generation network has been included, staring at the future. The Strategy Headquarters of New Generation Network Research & Development was established in October last year in order to strategically promote the above-mentioned plan. The Strategy Working Group was established under this headquarters to settle on visions for the future and prepare a roadmap to realize these visions. The Strategy Headquarters' mission includes the following: develop mid-term and long-term strategies as for the new generation network; announce its research and development strategies and its roadmap, both inside and outside Japan; play a leading role in the international collaboration and coexistence; plan to maintain consistency across all the research and development activities within NICT; foster human resources to view the long-term and international perspectives of research and development.

What do you mean "new generation" in the new generation network?

Harai: The words "new generation" refer to a totally new network that is free from any existing limitations.

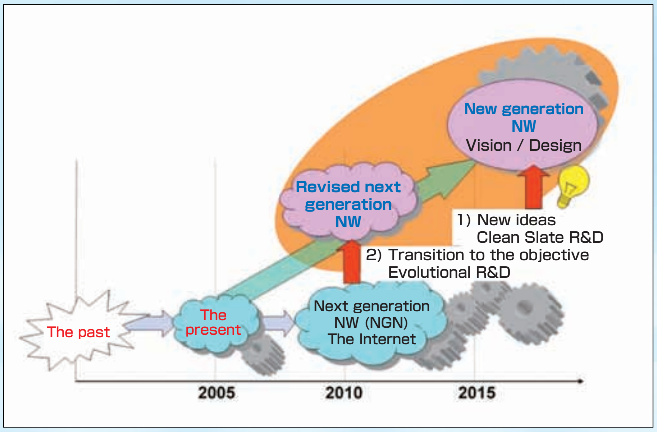


Fig.1: An Approach to the New Generation Network

We started studying the new generation network with the motto of creating a new network by abandoning the idea which the existing IT technologies and Internet technologies, and their current ideas of operations are obstacles. We intend to look at every issue that might concern the next 10 to 15 years of network technology in order to identify the techniques which are necessary for network creation and to establish a transitional roadmap for this purpose. Our plan is not only to create just a new network, but also to create an ideal network itself which caters to creating values.

The network which solves issues and creates new values

The Strategy Headquarters announced the "New Generation Network Vision" on Sep. 30 this year. What are the contents of the vision?

Harai: The basic idea is to use information and telecommunication technology and solve various social problems and issues. The first objective is to minimize problems related to energy, medical services, society of disparity, natality and aging, and food. The second objective is to create new values: broadening the knowledge domain of people, improving their productivity and quality of life, which should be made by using a new network. The third is to create some networks that can pay serious attention to cultural diversity and promote a new kind of cooperation in order to cope with the problems of conflict, antagonism, social gaps, and depopulation, which are caused by increasing globalization.

What concrete cases do you point out?

Harai: For example, the reduction of CO^2 emission and the environmental management based on environment sensing are issues in the field of energy, which, in our plan, can be solved by using the optical communication and the optical switching technology called photonic network technology which helps to reduce power consumption. In the field of natural disasters, issues have to be solved by establishing networks which can survive without interruption, even in a catastrophe. Furthermore, we believe that these issues can be resolved by a new technology for detecting earthquakes in instant and by using the terahertz sensing technology.

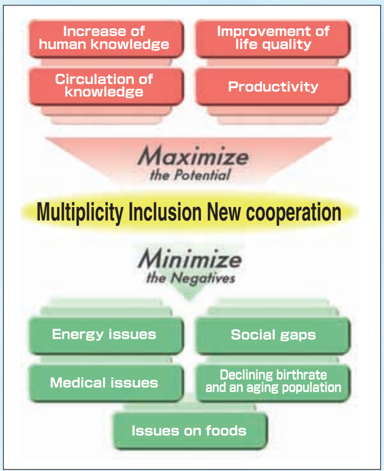


Fig.2:
Figure 2 Visions of New generation network

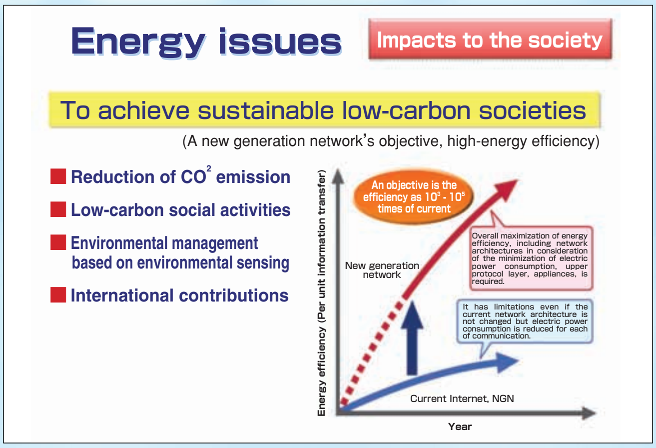


Fig.3: Circulation of knowledge

In the medical field, we will develop new generation networks is to establish tailor-made medical services which can provide the best possible health care, anytime and anywhere according to individuals. When sending high-resolution videos, 3D videos, patient's case records, and so forth, data transfer technologies for a big capacity and cryptographic security technologies by using optical networks can be utilized. Sooner or later, robots could be used, too.

What kind of task will the Strategy Headquarters be involved in from now?

Harai: First of all, we will arrange a technological roadmap by the end of this fiscal year and devise the necessary strategies. And then, we will promote technological development strategies and testbed studies, and subsequently carry out experimental verification on the testbed when a new network is established while considering their strategies. In addition to these, we will also pay attention to the respective strategies for technological transfer, funds available for our R & D activities, standardization of the technologies, and globalization.

Designing the network to support future societies

What are activities of the AKARI architecture designing project in the new generation network research?

Harai: We have made a conceptual design by the end of the second year of the project. This is a concept summarized about the importance of network architecture. Subsequently, we formulated three design principles for creating a new network: (1) Simplifying the network itself, (2) Linking virtual societies and real societies, and (3) Maintaining extensibility of the networks created. Originally, the aim of the AKARI project was to create a blueprint in 2011, but the first edition of that was completed last year. We plan to continue revising it. The final design of the ideal network will be created surely like this on the basis of the project's vision of the new generation network. However, we believe that we cannot reach our goal by simply chasing our ideals. Therefore, we will also create technical scenarios to achieve our goal in the project. Using the new generation network, a volume of data transmitted would be extremely increased. However, when data traffic volume becomes around 100,000 times as large as the present volume, it would become necessary to develop optical fiber networks to be able to transmit much more data. In consideration for designing the architecture in the AKARI project, the demands from various users and societies and the basic technology newly required have to be taken. Our intention is to create a common layer for the network not to play the role to create a new network for each application and to increase the flexibility of the network by making it compatible with any new technologies that would be developed in not only 10 to 20 but also 30 years.

What is your research theme?

Harai: For example, optical switching technology to be able to switch rapidly data in more or less one nanosecond; separation of physical / logical addresses in order to continuously send data; integration of the optical packet and the optical path; self-organizing control, wherein the system can autonomously judge what to do when the failure occurs due to the links disconnected at multiple points; the overlay network to test a new network and network virtualization. We will evaluate these issues on a new testbed while verifying them and making them reflect the newly acquired knowledge.

Finally, please summarize the importance of the new generation network.

Harai: We need to always think to live towards the future. When current issues are solved, a new issue will arise. Therefore, in addition to resolving problems, I believe that it is very important to create new values, and that our new generation networks technology will surely be the support for it.

Thank you very much.

Measurement of Air Flow in our Town

Development of High-Pulse-Compression Wind Profiler Radar for Dense 3D Observation of Urban Air

Profile

Shinya Sekizawa

Senior Researcher, Environment Sensing and Network Group, Applied Electromagnetic Research Center

Joined the Radio Research Laboratory, the Ministry of Posts and Telecommunications (current NICT); since then, engaged in studies on spread spectrum communication and determination of radio wave propagation characteristics in mobile communications; currently engaged in R&D of next-generation wind profiler radars with high frequency utilization efficiency.

Our life and urban air observation

We often hear about disasters and damages occurring in narrow regions, e.g., guerilla rains, local severe rains in urban areas, and tornadoes. In addition, urban-specific environmental changes such as the formation of heat islands, urban warming, and air pollution have received wide media coverage. The social and economic impact of these problems is as significant as that of worldwide geoenvironmental problems such as global warming.

If urban-specific meteorological and environmental information can be acquired from general weather forecasts and meteorological observations, it will enhance the safety and security of life. Today sophisticated computing capabilities and simulation techniques used in the earth simulations to estimate the future atmosphere state are remarkable, and it is said that the hitting ratio of weather forecast is dramatically improved. However, accurate estimation requires the acquisition of precise factual information (measured data). For example, the number of measuring stations for air pollution itself has increased by the Ministry of Environment and municipalities. However, the practical prediction of air pollution is difficult at this stage because air pollution has an adverse effect on neighboring areas and prefectures. The wind data collected by the Japan Meteorological Agency's AMeDAS (Automated Meteorological Data Acquisition System) is insufficient for air pollution prediction in its horizontal resolution.

As shown in Figure 1, the NICT is running the “Sensing Network” project in which advanced sensors such as radars and lidars are networked to obtain precise measured data and are applied to different fields. We are involved in the research and development of an advanced radar system called Wind Profiler Radar (WPR) using one of these sensors, which can measure the height profiles of wind velocity in narrow regions while eliminating radio interferences. This system is described below:

Dense observation of urban air and problems to be solved

The WPR is a radar system that measures the height profiles of wind direction and velocity from the ground. The Japan Meteorological Agency has built an observation network called WINDAS consisting of 31 WPRs across Japan, which monitors winds with a horizontal resolution of around 100 km. Data from WINDAS has been utilized in numerical forecasting. However, the horizontal resolution of WINDAS is less than the urban air's spatial scale and hence is not sufficient for numerical forecasting on the urban scale. If many WPRs are installed in a narrow region, the spatial resolution of the observed wind field would increase and hence the urban air could be treated, but the following problems will occur: The number of frequencies that can be used by the WPR in Japan are almost one per frequency band, and no appropriate observations can be concluded by using conventional radar systems due to interferences unless a considerable

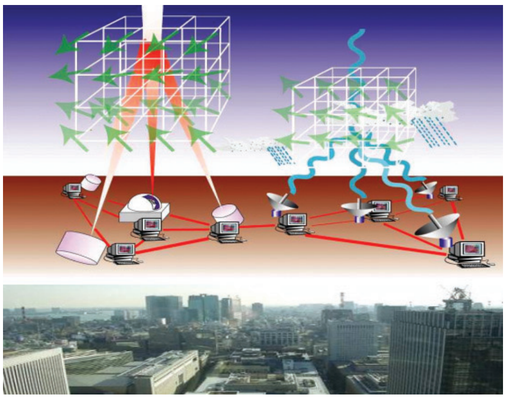


Fig.1: Image of Urban Air Observation System

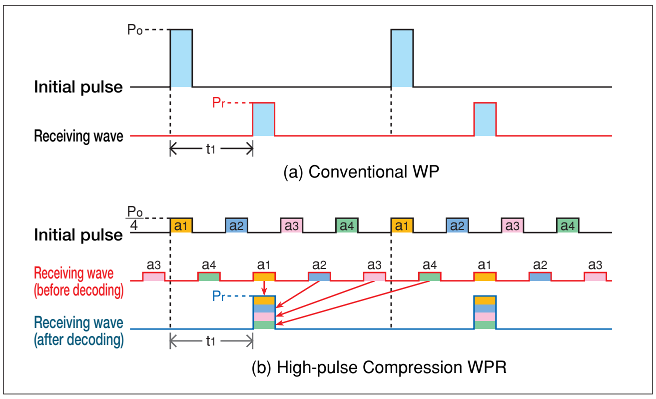


Fig.2: Fundamental Principle of Observations by the High-pulse Compression WPR (Diagram illustrating a case with one refractable)

distance is maintained between WPRs. In addition, it is very expensive to install many WPRs at short intervals in a given area. It is also difficult to install many WPRs in densely populated areas such as a metropolis, because the WPRs are large and require a considerable amount of power for transmission. To solve these problems, we have developed a high-pulse-compression WPR that uses a radio wave modulated with M-code sequences, which are code sequences used in cell-phones for user identification.

Fundamental principle of observations using the high-pulse-compression WPR

A conventional WPR transmits radio pulses skyward from an antenna, as shown in Figure 2 (a), and receives the radio wave which is reflected by a target at a certain altitude. The target for the WPR is turbulences in the atmosphere, and the direction and velocity of wind per altitude can be measured by conducting observations in more than three directions around the vertical. The radio wave reflected by the turbulence in the atmosphere is very weak. Therefore, high power pulses are usually used, and the received power is integrated over a long period to detect this signal. However, increasing the transmission power not only increases the size of the radar device but also results in radio interferences with neighboring stations that use the same frequency. In contrast, the high-pulse-compression WPR adds certain information to the transmission pulses, as shown in Figure 2 (b), and transmits much more pulses than a conventional WPR in order to integrate (decode) received signals for a certain period. Therefore, each transmission pulse requires less power than that of a conventional WPR. In addition to this, the high-pulse-compression WPR can differentiate between signals from its own stations and those from other stations by the added information of the long-period M-code sequence; hence, it remains unaffected by interferences from other stations.

Development of high-pulse-compression WPR

Figure 3 shows a newly developed high-pulse-compression WPR that can be operated in the 1.3-GHz band. Figure 3 (a) shows the transceiver of the WPR; the size of the transceiver is smaller than that of conventional WPRs having equivalent capacities because the transmission power is limited to 280 W. By installing three emitters in a parabolic antenna, we have developed a new defocused feed parabolic antenna having a diameter of 3 m, which can emit radio waves in three directions around the vertical (Fig. 3 (b)). The antenna has no mechanical drive for changing the direction of emitted radio waves. It is lightweight and easy to assemble and disassemble. Therefore, this antenna has only a few limitations on its installation. The overall system, which uses only one transceiver, can be smaller than a WPR having an array antenna. The high-pulse-compression WPR holds great promise as a radar system for urban applications.

We conducted a comparative field test in the Okinawa prefecture using a WPR that can be operated in the 400-MHz band, to confirm the observational capacities of the high-pulse-compression WPR. Figure 4 shows the results of the experiments. The maximum observed altitude of the high-pulse-compression WPR does not reach the value obtained by the 400-MHz WPR , which has high specifications, i.e., a transmission power of 20 kW and an antenna aperture of 108 m^2. However, the observational results obtained from both WPRs conform to each other below an altitude of 2 km. These results show the validity of the high-pulse-compression WPR with a particular kind of demodulation.

Future experiments and contributions to studies in relevant fields

Our compact, lightweight, and low-cost high-pulse-compression WPR which has high interference immunity can be installed in urban areas with a high density. We intend to manufacture multiple high-pulse-compression WPRs to experimentally demonstrate their robustness against interference waves. We plan to install multiple high-pulse-compression WPRs in urban areas and acquire and distribute the data from dense 3D observations of the urban air. We hope that these data will contribute to the improvement of forecast accuracy of urban weather and assist studies in relevant fields, e.g., these data can be used to understand the diffusion mechanism of air pollution.

(a)Transceivers

(b)Defocus Power Feeding Parabola Antenna

Fig.3: High-pulse Compression Wind Profiler

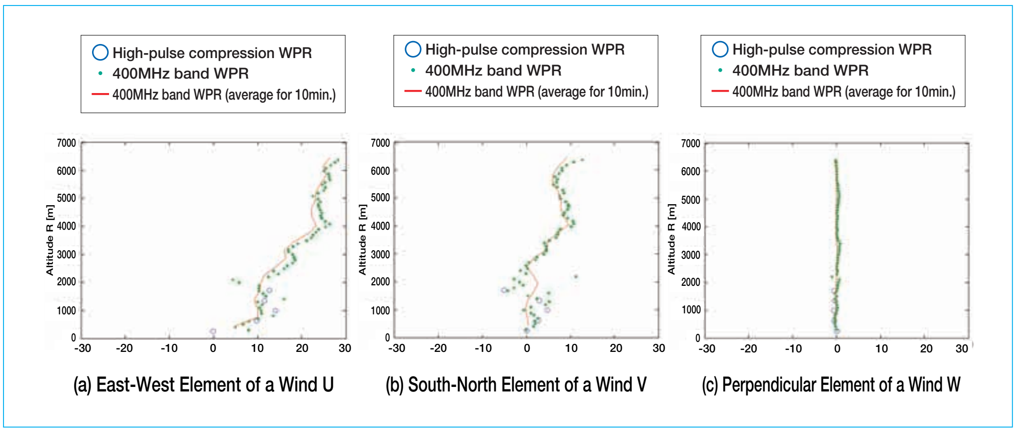


Fig.4: Results of Comparison for Wind Observations

fMRI

Playing an Active Role in the Most Advanced Brain Research

Advanced ICT Research Center

An Important Tool for Promising Brain Research

The 3.0-T high magnetic field MRI (Magnetic Resonance Imaging) equipment is installed in the MRI room of No. 3 Research Building at the Advanced ICT Research Center (Fig. 1).

MRI, which is widely used in the medical facilities, is based on nuclear magnetic resonance. In this process, a hydrogenic atom is used to acquire tomographic images of the human head and body. Although fMRI (functional Magnetic Resonance Imaging) and MRI equipments are manufactured using the same hardware, fMRI equipment can detect the brain's activities by measuring the increase of blood flow in the brain. For example, when we look at something or touch an object, neurons in the corresponding areas of the brain get excited, and the brain's blood flow increases. Therefore, by using fMRI, we can determine the area of the brain where such activities occur.

Brain research is being carried out by NICT in order to apply the human brain's advanced information processing functions to information and communication technologies. fMRI plays a very important role in the non-invasive measurement of the brain's activities and the visualization of brain information.

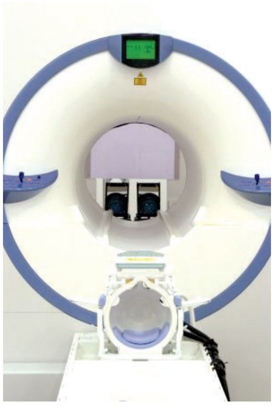


Fig.1: 3.0-T High Magnetic Field MRI Equipment

Observing the brain activities through fMRI

The 3.0-T high magnetic field MRI equipment has a better S/N (Signal-to-Noise) ratio than the 1.5-T MRI equipment. The former can also measure the brain's active area with high surface imagery. A strong magnetic field is generated by superconducting electromagnets cooled by liquid helium. An 8-channel phased array coil is eguipped for the component that receives the magnetic resonance signals from an examinee.

The magnetic field produced by the superconducting electromagnets is so strong that if a credit card is placed in its vicinity, the magnetic information stored on the card will be erased. Hence, it is prohibited to bring metals or magnetic cards into the room where the superconducting electromagnets are installed.

NICT started brain research using fMRI in Koganei City in 1993 and moved it to Kobe City in 1998. The new research building was resourcefully created, based on a well-considered design, to minimize the influences of minute vibrations and electromagnetic noises so as to build a research building optimal for non-invasive measurement through fMRI and magnetoencephalography.

The brain information project team of the Biological ICT Group and the NICT-CREST brain function imaging team are currently engaged in studies using fMRI.

Measurement of brain's activities during dreaming

The NICT-CREST brain function imaging team under Satoru Miyauchi, Research Manager is now addressing to measure the brain's activities during sleep. REM (Rapid Eye Movement) sleep and non-REM sleep occur alternatively during sleep. During REM sleep, which appears at intervals of approximately 90 minutes, our eyes frequently move and we see dreams. It was hypothesized in the 1950s that eyes move during dreaming because they trace the images appearing in the

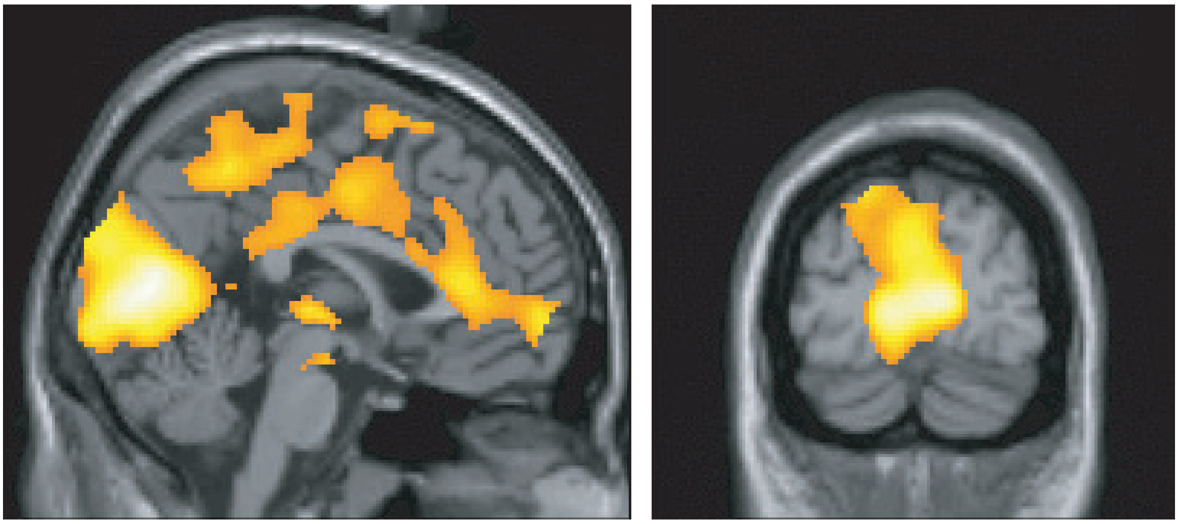


Fig.2: Brain Activities in Accordance with Rapid Eye Movements during REM Sleeps

dream; however, there has been no evidence to support this hypothesis.

Results of a study on brain activation time-locked to rapid eye movements during REM sleep using simultaneous EEG (ElectroEncephaloGraphy) recording with fMRI that began around 2002 have been recently published (Experimental Brain Research, DOI10.1007/s00221-008-1579-2). They indicate the occurrence of clear activities in the primary visual area corresponding to rapid eye movements during REM sleep. This result shows that we experience clear visual images in the form of dreams even when our eyes are closed during sleep. Furthermore, the study identified the activities of amygdalas and gyrus parahippocampalis, which have a bearing on emotion and memory but are normally inactive even during eye movement in the waking state (Fig. 2). More specifically, it seems that rapid eye movements during REM sleep are not random but playing an important role in generation of realistic dreams.

Measuring brain waves in strong magnetic field

It is difficult to measure the brain's activities during REM sleep using fMRI. "fMRI can identify the activated areas of the brain but it cannot determine whether an examinee is asleep or in an active state. To know whether the examinee is in REM sleep, it is necessary to measure the examinee's brain waves simultaneously," says Miyauchi. Measurement of brain waves with the MRI equipment which generates strong magnetic fields has been assumed to be difficult for a long time. However, breakthrough technologies and ingenuities have enabled coinstantaneous measurement of brain waves and activities during REM sleep using fMRI.

Dream is the ultimate virtual reality

People are reluctant to volunteer as examinees because they have to remain inside the MRI scanner for a long time until REM sleep occurs. However, NICT has the largest volume of data in the world, with regard to concurrent measurement of brain waves and measurement of the brain's activities using fMRI during REM sleep.

Miyauchi says, "Dream is the ultimate virtual reality which our brain spontaneously generates." Our brains create virtual reality almost indistinctive from the reality with no outer information given when we see dreams. Current technologies are incapable of artificially inducing such virtual reality. Novel technologies that support future information and telecommunication systems may be developed from the studies on physiological mechanisms for generating dreams.

Dr. Miyauchi and MRI Equipment

Profile

Satoru Miyauchi

Research Manager, Project Promotion Office, Kobe Advanced ICT Research Center

After completing his graduate course, studied at Brown University in the U.S. and the National Institute for Physiological Sciences (NIPS) of the National Institutes of Natural Sciences (NINS) in Japan; Joined the Communications Research Laboratory (current NICT) in 1993. At present, involved mainly in research and development of non-invasive brain function measurement systems such as fMRI / Magnetoencephalography / Electroencephalography; Doctor of Medical Sciences

Neuroimaging Platform

Databases for Neuroscience

Profile

Norio Fujimaki

Senior Researcher, Biological ICT Group, Kobe Advanced ICT Research Center

Received Ph.D. in engineering from University of Tokyo in 1980. Worked at Fujitsu Laboratories Ltd. from 1980 to 1998. Joined Communications Research Laboratory (current NICT) in 1999. First research theme involved a superconducting device; currently engaged in research on measurement and analysis of language-related brain activities.

Domestic and international organizations of neuroinformatics

The International Neuroinformatics Coordinating Facility (INCF), which was established in 2005 on the basis of advice from the Organization for Economic Co-operation and Development (OECD), aims at developing neuroscience and information technologies. The Neuroinformatics Japan Center (NIJC) has been established at the Brain Science Institute, RIKEN, with due support from the Ministry of Education, Culture, Sports, Science and Technology, Japan. Ten committees, including those in preparation, are actively contributing to the development and operation of databases for ten areas of neuroscience and also to making these databases available to a vast number of users.

NIMG-PF Committee

The neuroimaging platform (NIMG-PF), a platform among the ten fields, is currently involved in building databases related to various methods used for the measurement of non-invasive brain activity and the integration of these methods, in addition to databases for researches carried out using these methods . With several hundreds of databases available worldwide, this platform continues to collect systematic bibliographical information on articles, tutorials, developed software, experimental data and information on links that would be of possible use to beginners and professionals and thus supplement the existing databases in view of future developments in this field.

Neuroimaging platform (NIMG-PF) Committee (Members' name without titles)

Chairperson of PF	Ryoji Suzuki	Kanazawa Institute of Technology
Steering member	Kazuhisa Niki	Advanced Industrial Science and Technology
	Norio Fujimaki	National Institute of Information and Communications Technology
	Nobuo Masaki	ATR-Promotions
	Kazuhisa Ichikawa	Kanazawa Institute of Technology
Committee member	Shin'ya Kuriki	Hokkaido University
	Kawashima Ryuta	Tohoku University
	Seiji Ogawa	Tohoku Fukushi University
	Hiroshi Ito	National Institute of Radiological Science
	Yoshinori Uchikawa	Tokyo Denki University
	Cheng Kang	RIKEN
	Hideo Eda	The Graduate School for the Creation of New Photonics Industries
	Hiroki Tanabe	National Institute for Physiological Sciences
	Toshio Inui	Kyoto University
	Jiro Okuda	Kyoto Sangyo University
	Yosuke Kinouchi	The University of Tokushima
	Shogo Ueno	Kyushu University
	Keiji Iramina	Kyushu University

Since 2005, the NIMG-PF Committee, which comprises committee members (four steering committee members and thirteen committee members) from relevant institutes, has been working towards the development of a database for the abovementioned non-invasive brain activity under the direction of Prof. Ryoji Suzuki, Chairperson of the PF Committee; this database has tentatively been made available on the Internet (http://platform.nimg. neuroinf.jp/) since March 2008 (free browsing under certain conditions: user registration and uploading of content are permitted only for selected users).

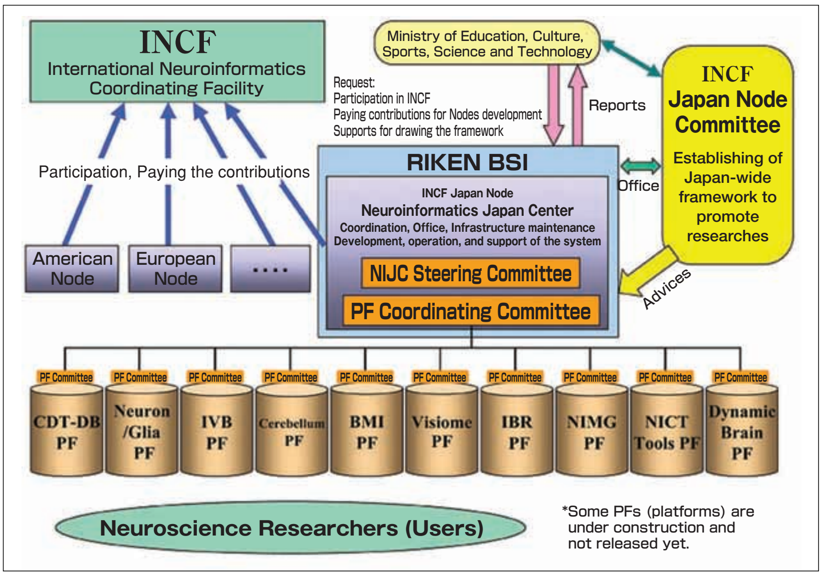


Fig.1: Neuroinformatics System
(Cited from http://www.brain.riken.jp/bsi-news/jp/no39/feature.html with an approval of RIKEN BSI)

Configuration of the database systems

The NIMG-PF has been built on a base platform, XooNIps, which is operated by RIKEN NIJC. Users can search for content using an index, keyword, or item type. The index in NIMG-PF consists of three layers. The uppermost layer includes the following items: Imaging Method, Tutorial, Brain Function, Task, Stimulation, Brain Area, Temporal and Frequency Component, Model, Technology, and Link. The lowermost layer includes approximately 200 items.

Registration and retrieval of the public content

The steering committee members and committee members of NIMG-PF have already registered more than 400 items as public content on the NIMG-PF database. These items include bibliographical information on articles, inverse problem software (fMRI-constrained MEG analysis method) developed by this author for estimating the source of brain activity from MEG data, experiment tutorials and videos for beginners, raw experimental data, and an introductory paper on neuroimaging written by Dr. Masaki (ATR). The extended function developed by Dr. Niki (Advanced Industrial Science and Technology) has made it possible to view images of the brain online and search articles related to the activities occurring in a specific area of the brain. sBrain, developed by Prof. Ichikawa at Kanazawa Institute of Technology, can be easily downloaded and helps view 3D images of the brain, carry out relevant searches, and simulate brain activities.

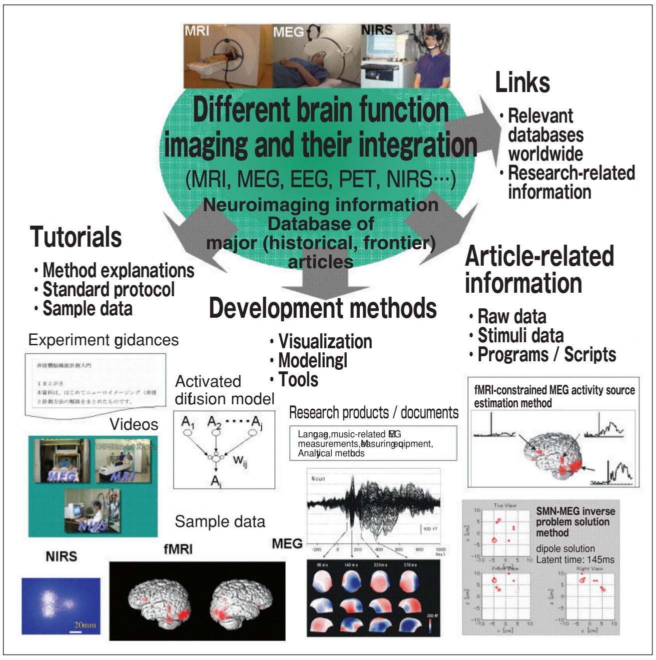


Fig.2: Contents of NIMG-PF

Licensing

Users can set up licensing terms regarding the commercial use and modification of their contents in accordance with Creative Commons (http://creativecommons.org/license) and apply for registration of their public content. Such content can be published subject to the intellectual property rights of the organization of which the applicant is associated with and approval from experimental subjects if personal data are included in the public content. Finally, only content whose quality has been approved will be published. Users can gain access to these contents after they agree to the licensing conditions.

Enhanced worldwide opportunities for configuring database

The 1st INCF Congress of Neuroinformatics was held from Sep. 7 to Sep. 9, 2008 in Stockholm; around 270 neuroscience professionals came together for interesting discussions. Currently, the INCF has fourteen participant countries; this has resulted in a worldwide increase in the opportunities for configuring database.

NIMG-PF users can browse relevant websites, download necessary infor-mation, and publish the contents they develop. We are currently promoting the preparation of the full-scale publication of such contents and are hopeful that this database will be soon flooded with information that will be useful to scientists carrying out studies on the brain.

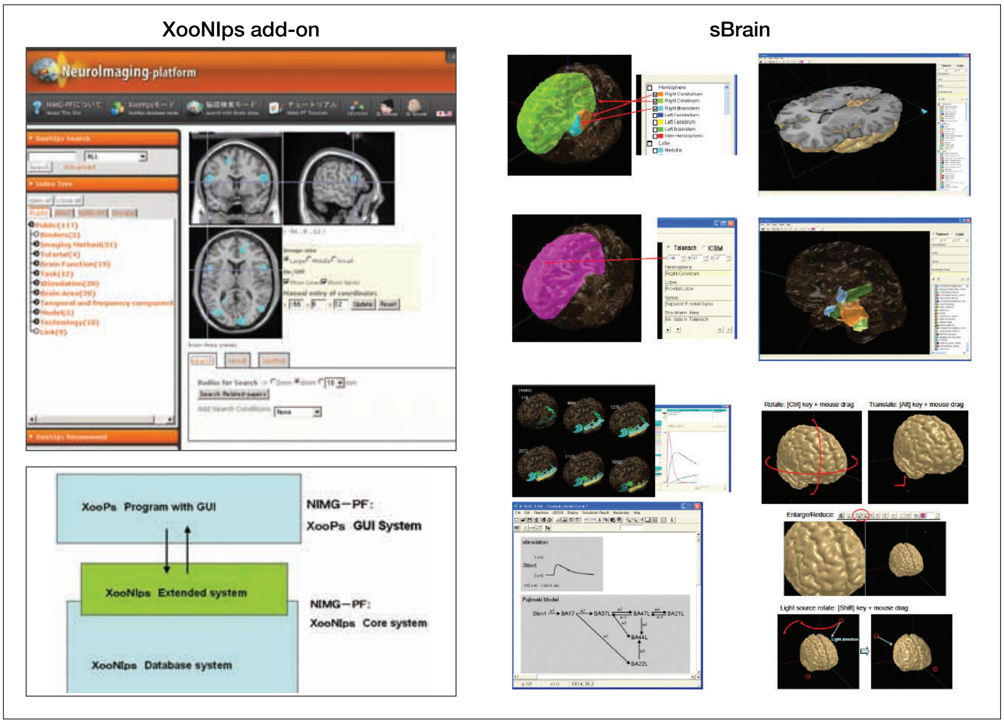


Fig.3: Visualization of Brain Image

Pridicting the State of the Ionosphere by means of Numerical Simulation

For Improving the Accuracy of Space Weather Forecast

Profile

Hidekatsu Jin

Expert Researcher, Space Environment Group, Applied Electromagnetic Research Center

In 2004, after completing his doctoral course in science, Dr. Jin joined NICT and was involved in studies on the development of an atmosphere–ionosphere simulation model.

Importance of Ionosphere simulations on the way to be recognized at domestic and international institutes

The neutral atmosphere extends from the earth's surface to an altitude of 800 km and is composed of neutral atoms and molecules. Solar ultraviolet radiation separates a portion of neutral atmosphere into ions and electrons. The ionosphere extending to an altitude of 60 km up to 1000 km from the earth's surface is composed of these ions and electrons. Variations and disturbances in the ionosphere have a significant impact on satellite communications and the use of satellite positioning systems such as GPS. Therefore, it is very important to observe and determine the state of the ionosphere. Since over 60 years ago, NICT has been observing the state of the ionosphere, if calculated from the time of its former organization. On the other hand, recent developments in computing, such as the development of supercomputers, have helped domestic and international institutes recognize the importance of studying the ionosphere through numerical simulation.

More accurate space weather forecast will be possible by taking the impact of meteorological weather into consideration

Dr. Jin, an Expert Researcher, is currently engaged in carrying out numerical simulations of the coupled atmosphere and ionosphere. According to him, "It is a study to solve equations of physical laws and to simulate the state of neutral and ionized airs expanding from the earth's surface to upper atmosphere using computers." This numerical model is being developed through a collaboration among NICT, Kyushu University and Tohoku University, and Dr. Jin is in charge of carrying out studies on the electrodynamics connecting the atmosphere and the ionosphere, that is, the portion bridging the neutral and ionized airs. He further states, "It is now understood that the some part of ionospheric state comes under influence of meteorological phenomena near the earth's surface, such as distributions of precipitation, and therefore, it is very important to connect the ionosphere and lower atmosphere. When this study is complete, it can seamlessly simulate the wide area from the earth's surface to the ionosphere and calculate the variations of the ionosphere."

"Currently, we can simulate the day-to-day variations and spatial distribution of the ionosphere including the impacts of the lower atmosphere, which could not be simulated in the past. Our simulation has reached a level of being close to the actual ionosphere." However, Dr. Jin mentions that currently, only one-way impacts within the atmosphere and the ionosphere are being taken into account in the calculations, and two-way impacts will be accounted for in the future. He says, "I think the future space weather forecast can include the impacts from meteorological weather when seamless simulations are conducted and the accuracy of the calculations will be improved."

PrizeWinners

PRIZE WINNER ● Daisuke Inoue, Masashi Etou, and Koji Nakao

Network Security Incident Response Group, Information Security Research Center
First author:Katsunari Yoshioka
Yokohama National University(former:Researcher, National Institute of Information and Communications Technology)

◎DATE : 10.7.2008
◎NAME OF THE WINNING PRIZE : Best Paper Award at the 3rd Joint Workshop on Information Security (JWIS 2008)
◎CONTENTS OF THE WINNING PRIZE : Malware Sandbox Analysis for Extracting Exploit Codes
◎NAME OF GROUP : The Technical Program Committee of The 3rd Joint Workshop on Information Security

◎Comment by the Winner:

This research was proposed as a method for safe and effective analysis of malware such as computer virus. This time, I am greatly proud that our proposal was evaluated for this award. This research was conducted as part of the nicter project which our group has been implementing, and this award was the results of our group's whole activities. I, herewith, express to the relevant parties my great gratitude. Moreover, I hope that our proposal will contribute to the safety on the Internet.

PRIZE WINNER ● Tomoaki Nagaoka

Expert Researcher, Electromagnetic Compatibility Group, Applied Electromagnetic Research Center

◎DATE : 8.20.2008
◎NAME OF THE WINNING PRIZE : URSI Young Scientist Award
◎CONTENTS OF THE WINNING PRIZE : Technique using implicit fairing and specific absorption rates to improve spatial resolution of whole-body human voxel models exposed to plane waves in GHz bands
◎NAME OF GROUP : International Union of Radio Science

◎Comment by the Winner:

I am greatly honored to receive this award for my research on validation technique for electro-magnetic wave exposure by using numeric human body models. Being stimulated by this award, I will strive for the research on safety validation for the human body exposed by radio waves. Besides, I would like to express to everyone my gratitude for helping me for this award.

PRIZE WINNER ● Seiichiro Kawase

Executive Researcher

◎DATE : 10.31.2008
◎NAME OF THE WINNING PRIZE : Maejima Award
◎CONTENTS OF THE WINNING PRIZE : Development of Space Radio Monitoring Technology
◎NAME OF GROUP : The Institute of Electrical Engineers of Japan

◎Comment by the Winner:

I am very happy and grateful to receive such a great award. As for some formalities, I would like to apologize for the troubles which were caused by the lack of my experience that I have never received any award so far. I would like to express my gratitude to everyone who supported me.

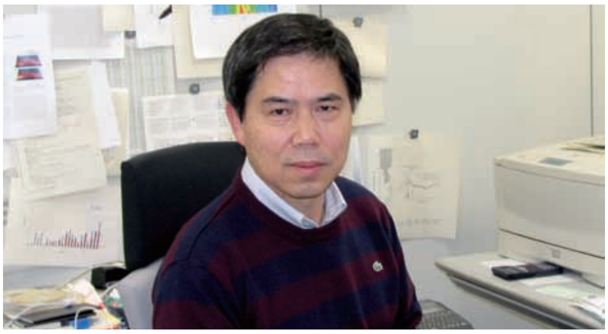
PRIZE WINNER ● Takashi Maruyama

Senior Researcher, Project Promotion Office, Applied Electromagnetic Research Center

◎DATE : 10.31.2008
◎NAME OF THE WINNING PRIZE : Maejima Award
◎CONTENTS OF THE WINNING PRIZE : Development of Radiowave Propagation Trouble Forecast Technology for Improving the Satellite Positioning Accuracy
◎NAME OF GROUP : Foundation for TEISHIN Association

◎Comment by the Winner:

Radio-wave propagation is a classic yet a new issue. The radio wave emitted from satellites passes through the area called the ionosphere. The research on the variations of the ionosphere is of great significance in considering the ionosphere influence to the advanced use of satellite radio wave. The Maejima Award which I received is a symbol of current importance of ionosphere research, which will encourage all of the groups in this field.



Report of Participation in SuperComputing 2008 (SC08)

~An International Event Using Supercomputers and Networks~

SuperComputing 2008 (SC08), the world's biggest conference and exhibition on super computing, was held in Austin USA on Nov. 15th to 21th in 2008 and NICT presented and exhibited the various research results on advanced computers. This year, it was the 20th conference and about 11 thousands participants, the largest number in the history of SC, gathered to this big event. SC08 was a very unique conference including Bandwidth Challenge and Cluster Challenge, where researchers from the whole world were competing with each other at the site with their research results on super computers and networks. NICT performed presentations and exhibitions on Space Weather Forecast, e-VLBI Radio-Wave Observation Technology and the various demonstrative experiments by using the JGN2plus network (Fig. 1) to exchange opinions from users' perspectives among many researchers and Austin citizens on the visualization and understandability of the research results.

Besides, NICT exhibited 3D displays, rotary LED displays (Fig. 2) and tiled displays as visualized simulation results by a supercomputer. NICT was also successful for the first time in a demonstrative experiment of automatic network configuration technology, called DCN (Dynamic Circuit Network) between Asia and U.S.A., in collaboration with research institutes around the world.

NICT will continue the research on advanced simulation and the like by using supercomputers, etc. and promote the research and development on visualization technologies, etc. to express our research results in understandable manners and announce them in SC as well as at NICT's web site and various exhibitions and so on. Please don't miss them!

Fig.1: NICT Booth

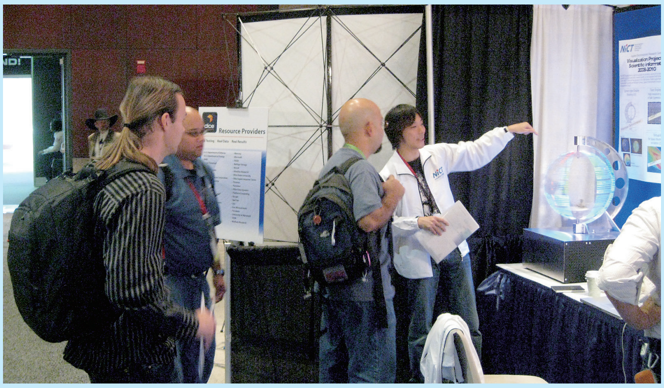


Fig.2: An Exhibit of Simulation Results through a Rotary LED Display

Information for Readers:

The next issue of NICT NEWS will feature the Kobe Advanced ICT Research Center which will aim for the creation of future ICT technologies through Information and Telecommunications Technology, Nano Research, and Bio Research.

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